

FIG. 1

|         | Desired diagnosis fee | Equipment desired to be diagnosed | Precision of diagnosis | Air temperature | Humidity  | Concentration of chlorine gas | -- |
|---------|-----------------------|-----------------------------------|------------------------|-----------------|-----------|-------------------------------|----|
| User a1 | 300,000 yen           | Control panel                     | Degradation diagnosis  | 30              | 80        | 0.03 ppm                      | -- |
| User a2 | 500,000 yen           | Circuit board                     | Degradation diagnosis  | 20              | 60        | 0.08 ppm                      | -- |
| User a3 | 1,000,000 yen         | Logic IC                          | Life diagnosis         | 20              | 60        | 0.07 ppm                      | -- |
| User a4 | 200,000 yen           | Relay board                       | Degradation diagnosis  | 15              | Not known | Not known                     | -- |
| -       | -                     | -                                 | -                      | -               | -         | -                             | -- |
| -       | -                     | -                                 | -                      | -               | -         | -                             | -- |
| -       | -                     | -                                 | -                      | -               | -         | -                             | -- |

FIG. 2

|                                | Diagnostic fee | Equipment to be diagnosed | Precision of diagnosis | Environmental data required                   | Equipment information required                      | -- |
|--------------------------------|----------------|---------------------------|------------------------|-----------------------------------------------|-----------------------------------------------------|----|
| Diagnostic service provider b1 | 500,000 yen    | Control device            | Life diagnosis         | Air temperature, concentration of chlorine .. | Date of installation...                             | -- |
| Diagnostic service provider b2 | 3,000,000 yen  | EWS                       | Degradation diagnosis  | Air temperature, amount of dust...            | ...                                                 | -- |
| Diagnostic service provider b3 | 1,000,000 yen  | Ordinary IC               | Life diagnosis         | Humidity...                                   | Date of manufacture of the IC, type of sealing film | -- |
| Diagnostic service provider b4 | 100,000 yen    | Circuit board             | Degradation diagnosis  | Humidity, chlorine concentration...           | Width of wiring, type of resist                     | -- |
| -                              | -              | -                         | -                      | -                                             | -                                                   | -  |
| -                              | -              | -                         | -                      | -                                             | -                                                   | -  |
| -                              | -              | -                         | -                      | -                                             | -                                                   | -  |

FIG. 3

|                              | Examination<br>fee | Environmental data capable<br>of being examined | -- |
|------------------------------|--------------------|-------------------------------------------------|----|
| Environmental<br>measurer c1 | 50,000 yen         | Air temperature, humidity                       | -- |
| Environmental<br>measurer c2 | 300,000 yen        | Amount of dust                                  | -- |
| Environmental<br>measurer c3 | 100,000 yen        | Concentration of various<br>gases; one type     | -- |
| Environmental<br>measurer c4 | 100,000 yen        | Air temperature, humidity,<br>amount of wind    | -- |
| -                            | -                  | -                                               | -- |
| -                            | -                  | -                                               | -- |
| -                            | -                  | -                                               | -- |

FIG. 4

| Equipment             | Type of equipment          | Various ratings                                                           | -- |
|-----------------------|----------------------------|---------------------------------------------------------------------------|----|
| Equipment supplier d1 | Logic IC                   | Copper wiring, wiring width 15 micron...                                  | -- |
| Equipment supplier d2 | Circuit board              | Copper pattern, wiring width 0.25 mm, wiring separation 0.5 mm...         | -- |
| Equipment supplier d3 | MY type relay              | Metal joint, contact resistance 0.1 mΩ, coil: enamel coating...           | -- |
| Equipment supplier d4 | Circuit board (before '94) | Copper pattern, wiring width 2 mm, wiring separation 2 mm, no resist film | -- |
| -                     | -                          | -                                                                         | -- |
| -                     | -                          | -                                                                         | -- |
| -                     | -                          | -                                                                         | -- |

FIG. 5

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|                                | Environmental data required for diagnosis |   |   |   |   | Diagnosis fee |
|--------------------------------|-------------------------------------------|---|---|---|---|---------------|
|                                | A                                         | B | C | D | E |               |
| Diagnostic service provider b1 | ○                                         | ○ |   |   |   | Fa            |
| Diagnostic service provider b2 | ○                                         | ○ | ○ |   |   | Fb            |
| Diagnostic service provider b3 | ○                                         |   | ○ | ○ |   | Fc            |
| Diagnostic service provider b4 | ○                                         |   | ○ | ○ | ○ | Fd            |

FIG. 6



|                           | Environmental data capable of examination |   |   |   |   | Measurement fee |
|---------------------------|-------------------------------------------|---|---|---|---|-----------------|
|                           | A                                         | B | C | D | E |                 |
| Environmental measurer c1 | ○                                         | ○ |   |   | ○ | F1              |
| Environmental measurer c2 |                                           |   | ○ | ○ | ○ | F2              |
| Environmental measurer c3 | ○                                         |   | ○ |   | ○ | F3              |
| Environmental measurer c4 |                                           |   | ○ |   | ○ | F4              |
| Environmental measurer c5 |                                           | ○ |   |   | ○ | F5              |

FIG. 7

|                                   | Deficient<br>environmental data | Environmental measurers capable<br>of examining the deficient<br>environmental data |
|-----------------------------------|---------------------------------|-------------------------------------------------------------------------------------|
| Diagnostic service<br>provider b1 | B                               | c1, c5                                                                              |
| Diagnostic service<br>provider b2 | B                               | c1, c5                                                                              |
| Diagnostic service<br>provider b3 | D                               | c2                                                                                  |
| Diagnostic service<br>provider b4 | D, E                            | c2                                                                                  |

FIG. 8



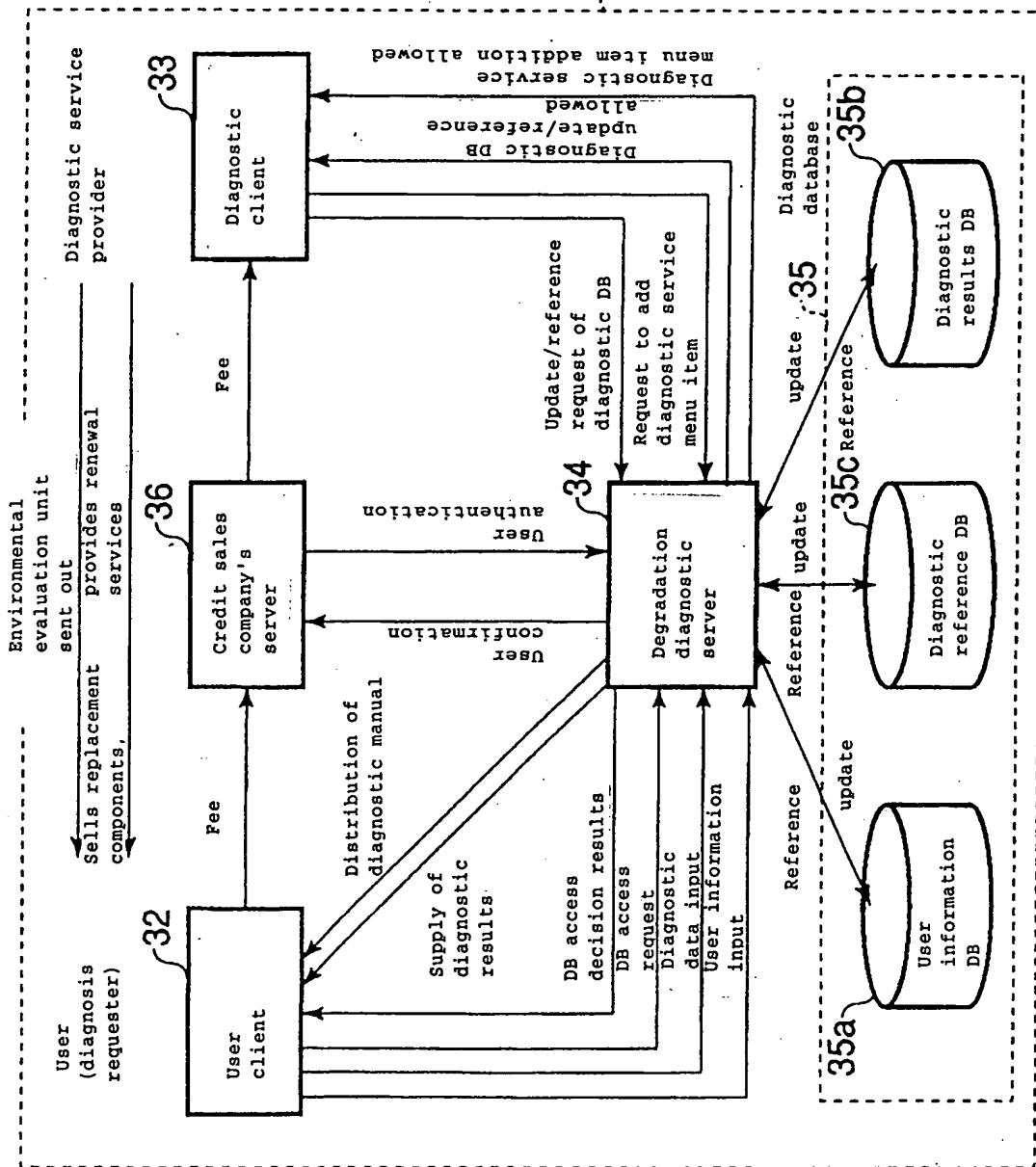


FIG. 9

Desired fee: M

|             | Diagnostic service provider | Environmental measurer | Diagnosis fee |
|-------------|-----------------------------|------------------------|---------------|
| Candidate 1 | b4                          | c2                     | Fd+F2+m       |
| Candidate 2 | b3                          | c2                     | Fc+F2+m       |
| Candidate 3 | b2                          | c5                     | Fb+F5+m       |
| Candidate 4 | b2                          | c1                     | Fb+F1+m       |
| Candidate 5 | b1                          | c5                     | Fa+F5+m       |
| Candidate 6 | b1                          | c1                     | Over budget   |

FIG. 9



31 Deterioration  
diagnosis  
system

FIG. 10

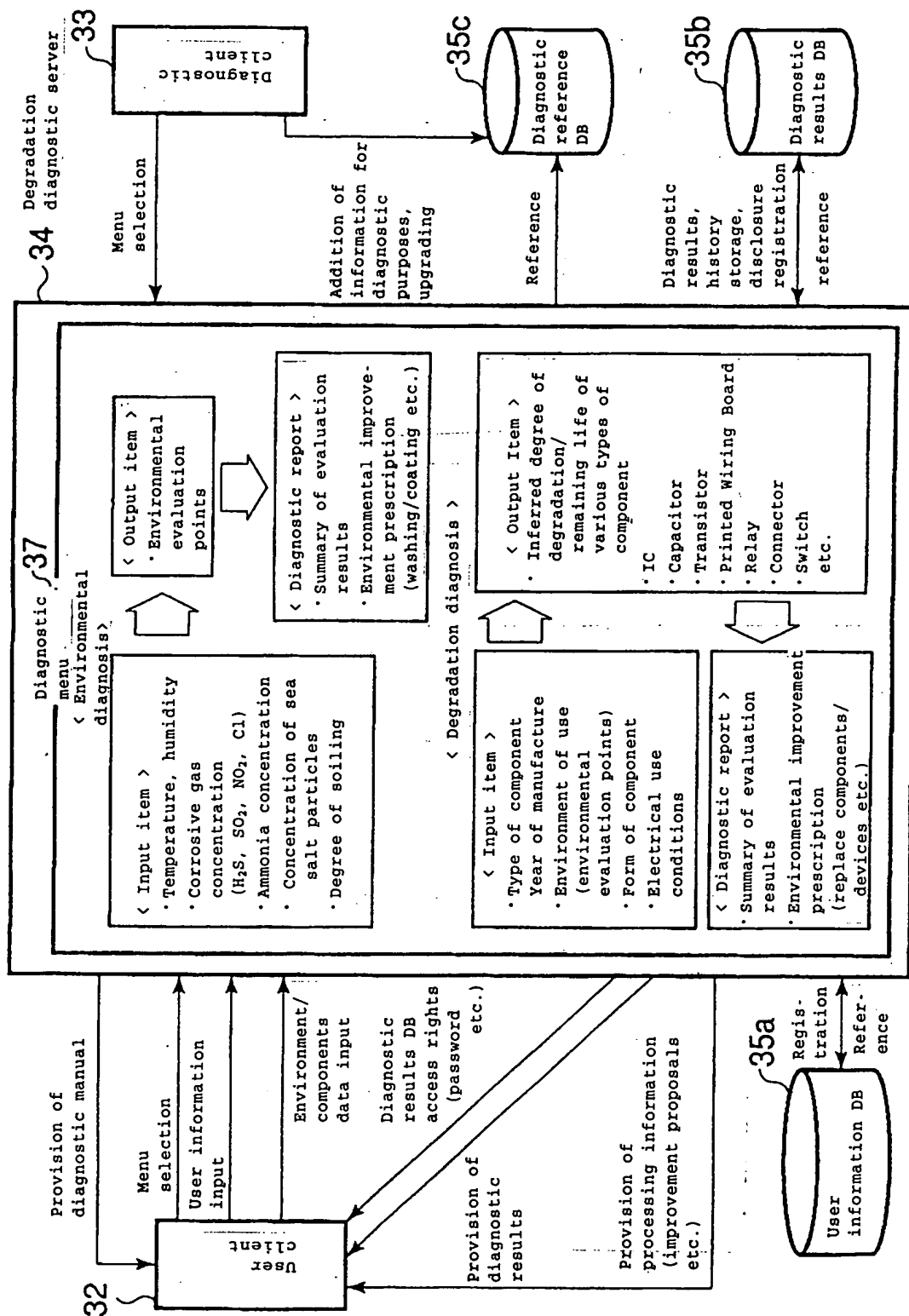


FIG. 11

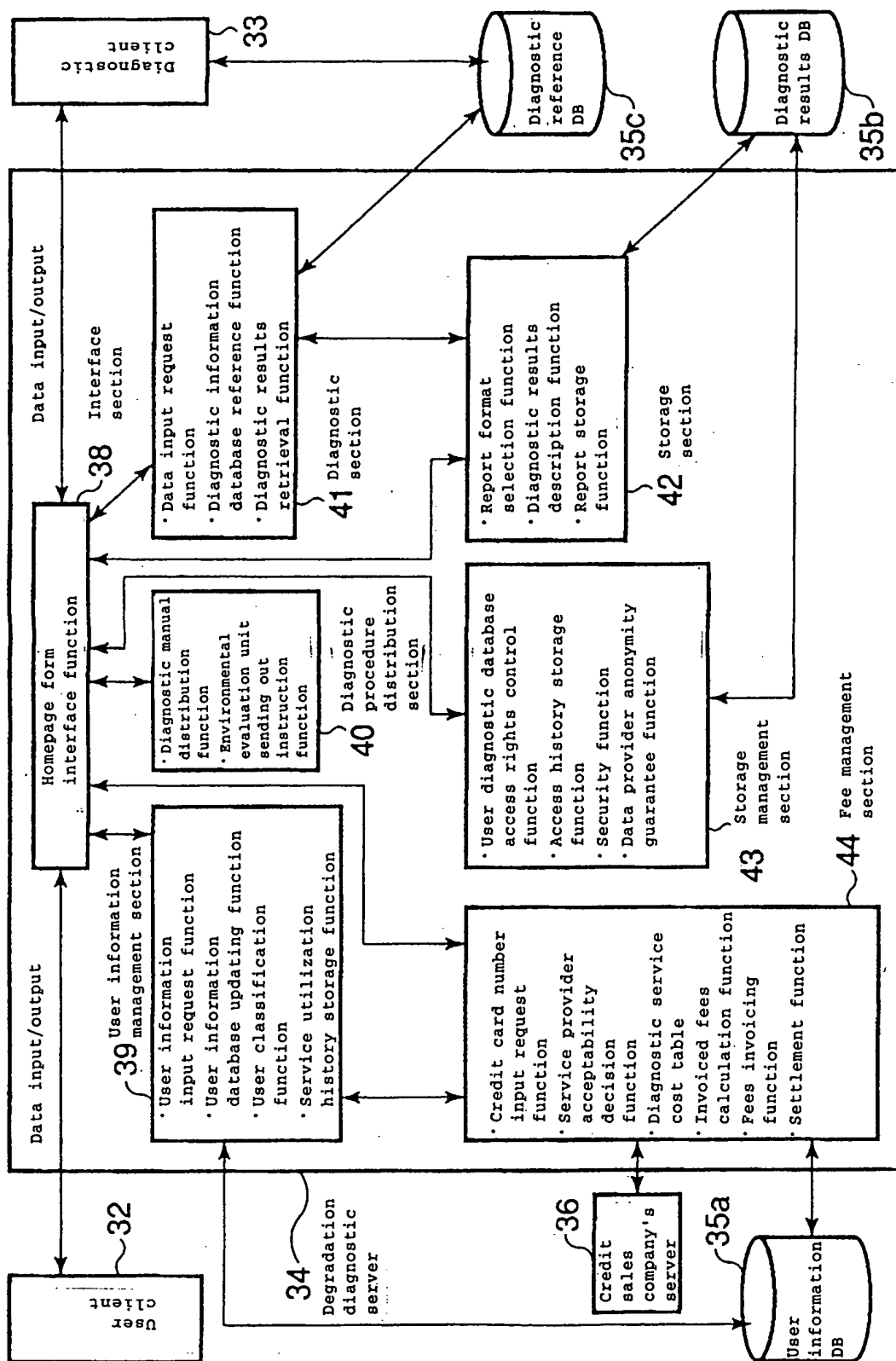


FIG. 12

Environmental range table 45

| Environmental factors |                                                            | Ranges                       |                    |                   |                |
|-----------------------|------------------------------------------------------------|------------------------------|--------------------|-------------------|----------------|
|                       |                                                            | I                            | II                 | III               | IV             |
| Temperature (°C)      | Annual average                                             | A 20 or less                 | 20 < and ≤ 50      | 25 < and ≤ 30     | More than 30   |
| Relative humidity (%) | Rainy season average                                       | B 60 or less                 | 60 < and ≤ 70      | 70 < and ≤ 85     | More than 85   |
|                       | Annual average                                             | 50 or less                   | 50 < and ≤ 60      | 60 < and ≤ 75     | More than 75   |
| Gas (ppm)             | Sulphur dioxide (SO <sub>2</sub> )                         | C <sub>1</sub> 0.04 or less  | 0.04 < and ≤ 0.08  | 0.08 < and ≤ 0.2  | 0.2 < and ≤ 5  |
|                       | Nitrogen dioxide (NO <sub>2</sub> )                        | C <sub>2</sub> 0.02 or less  | 0.02 < and ≤ 0.05  | 0.05 < and ≤ 0.1  | 0.1 < and ≤ 5  |
|                       | Hydrogen sulphide (H <sub>2</sub> S)                       | C <sub>3</sub> 0.003 or less | 0.003 < and ≤ 0.01 | 0.01 < and ≤ 0.1  | 0.1 < and ≤ 10 |
|                       | Chlorine gas (Cl <sub>2</sub> )                            | C <sub>4</sub> 0.002 or less | 0.002 < and ≤ 0.01 | 0.01 < and ≤ 0.1  | 0.1 < and ≤ 1  |
|                       | Ammonia gas (NH <sub>3</sub> )                             | C <sub>5</sub> 0.1 or less   | 0.1 < and ≤ 1      | 1 < and ≤ 10      | 10 < and ≤ 100 |
| Degree of soiling     | Equivalent salt deposition rate (mg/cm <sup>2</sup> /year) | D 0.03 or less               | 0.03 < and ≤ 0.06  | 0.06 < and ≤ 0.12 | More than 0.12 |
|                       | Distance from coast (km)                                   | More than 2                  | 1 < and ≤ 2        | 0.5 < and ≤ 1     | Less than 0.5  |

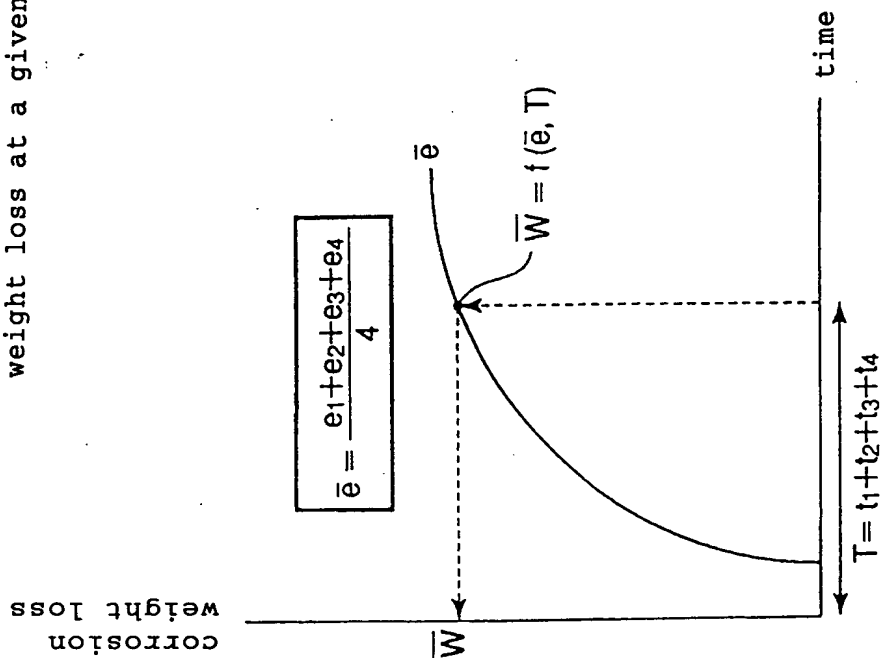
FIG. 13

Environmental factor weighting table 46

| Environmental factor | Range |    |     |    |
|----------------------|-------|----|-----|----|
|                      | I     | II | III | IV |
| A                    | 1     | 2  | 4   | 8  |
| B                    | 1     | 8  | 16  | 24 |
| C <sub>1</sub>       | 1     | 3  | 6   | 9  |
| C <sub>2</sub>       | 1     | 3  | 6   | 9  |
| C <sub>3</sub>       | 1     | 8  | 14  | 20 |
| C <sub>4</sub>       | 1     | 10 | 20  | 30 |
| C <sub>5</sub>       | 1     | 2  | 4   | 8  |
| D                    | 1     | 8  | 15  | 24 |

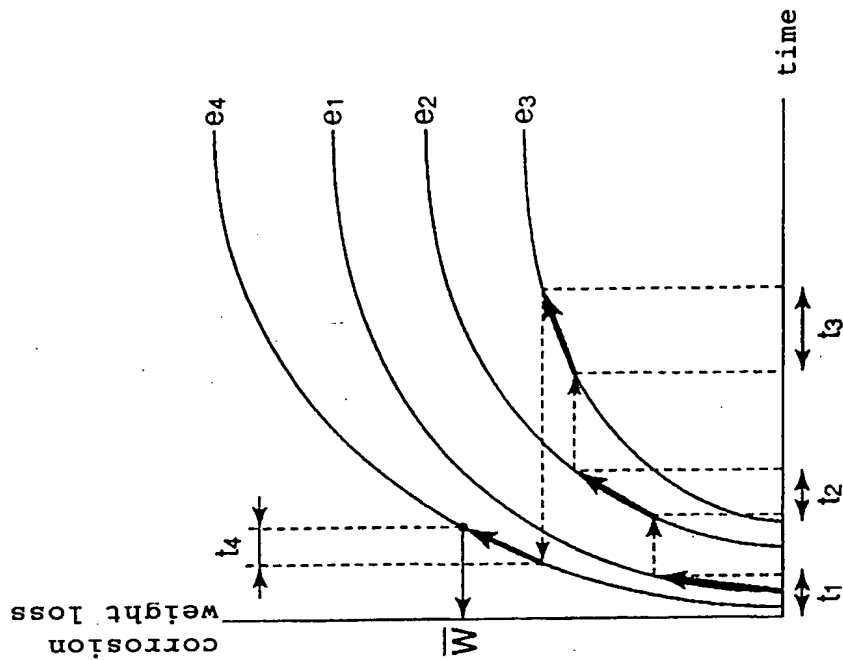
FIG. 14

Process of derivation of metal corrosion weight loss at a given time  $T=t_1+t_2+t_3+t_4$



Process of derivation of mean corrosion weight loss

FIG. 1 5 A



Process of derivation of precise corrosion weight loss

FIG. 1 5 B

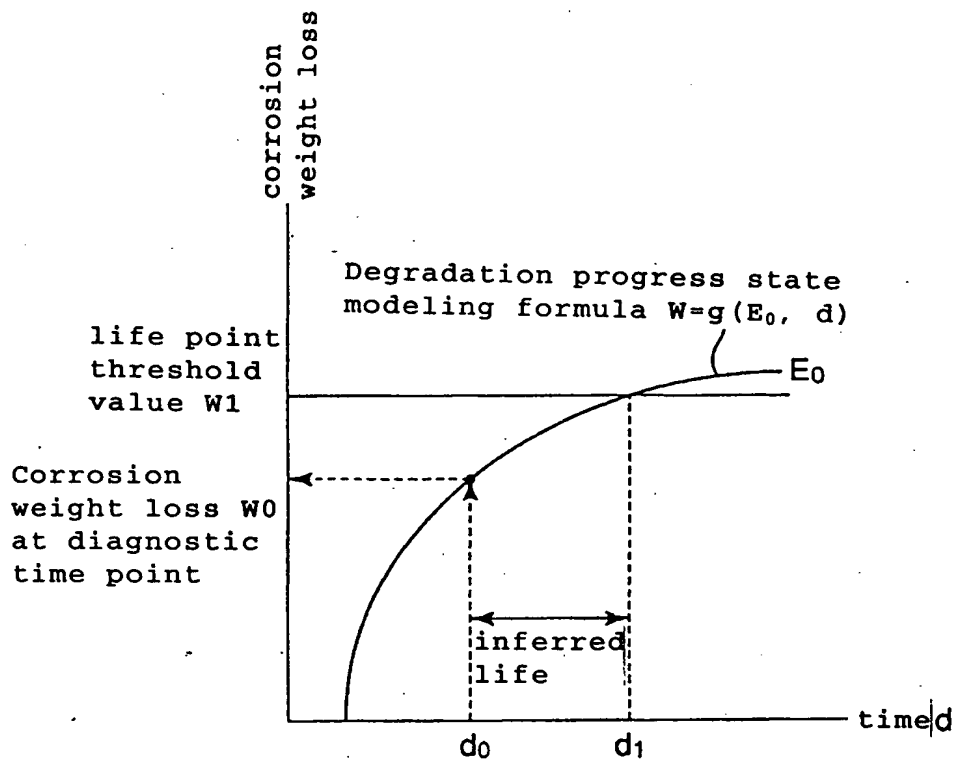


FIG. 1 6



Environmental evaluation points zone table 47

| Atmospheric environmental ranges |                          | I                        |                   | II              |                   | III             |                   | IV              |                   | V               |                   |
|----------------------------------|--------------------------|--------------------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|
| Environmental factors            |                          | Measured values          | Evaluation points | Measured values | Evaluation points | Measured values | Evaluation points | Measured values | Evaluation points | Measured values | Evaluation points |
|                                  |                          |                          |                   |                 |                   |                 |                   |                 |                   |                 |                   |
| Corrosive gas (mdd)              | Temperature (°C)         | A                        | ≤20               | 1               | 2                 | ≤30             | 4                 | ≤35             | 8                 | >35             | 12                |
|                                  | Relative humidity (%RH)  | B                        | ≤60               | 1               | 6                 | ≤70             | 12                | ≤80             | 24                | >80             | 36                |
|                                  | SO <sub>2</sub>          | CO <sub>2</sub>          | ≤0.02             | 1               | 4                 | ≤0.2            | 8                 | ≤0.5            | 16                | >0.5            | 24                |
|                                  |                          | H <sub>2</sub> S         | ≤0.02             | 1               | 6                 | ≤0.2            | 12                | ≤0.5            | 24                | >0.5            | 36                |
|                                  | NO <sub>x</sub>          | C3                       | ≤0.02             | 1               | 3                 | ≤0.2            | 6                 | ≤0.5            | 12                | >0.5            | 18                |
|                                  |                          | C4                       | ≤0.02             | 1               | 7                 | ≤0.2            | 14                | ≤0.5            | 28                | >0.5            | 42                |
|                                  | NH <sub>3</sub>          | C5                       | ≤0.02             | 1               | 3                 | ≤1.0            | 6                 | ≤10             | 12                | >10             | 18                |
|                                  |                          | Sea salt particles (mdd) | ≤0.01             | 1               | 5                 | ≤0.1            | 10                | ≤0.3            | 20                | >0.3            | 30                |
|                                  | Distance from coast (km) | D                        | >2.0              | 1               | ≥1.5              | ≥1.0            | 10                | ≥0.5            | 20                | <0.5            | 30                |
|                                  |                          |                          |                   |                 |                   |                 |                   |                 |                   |                 |                   |

FIG. 17

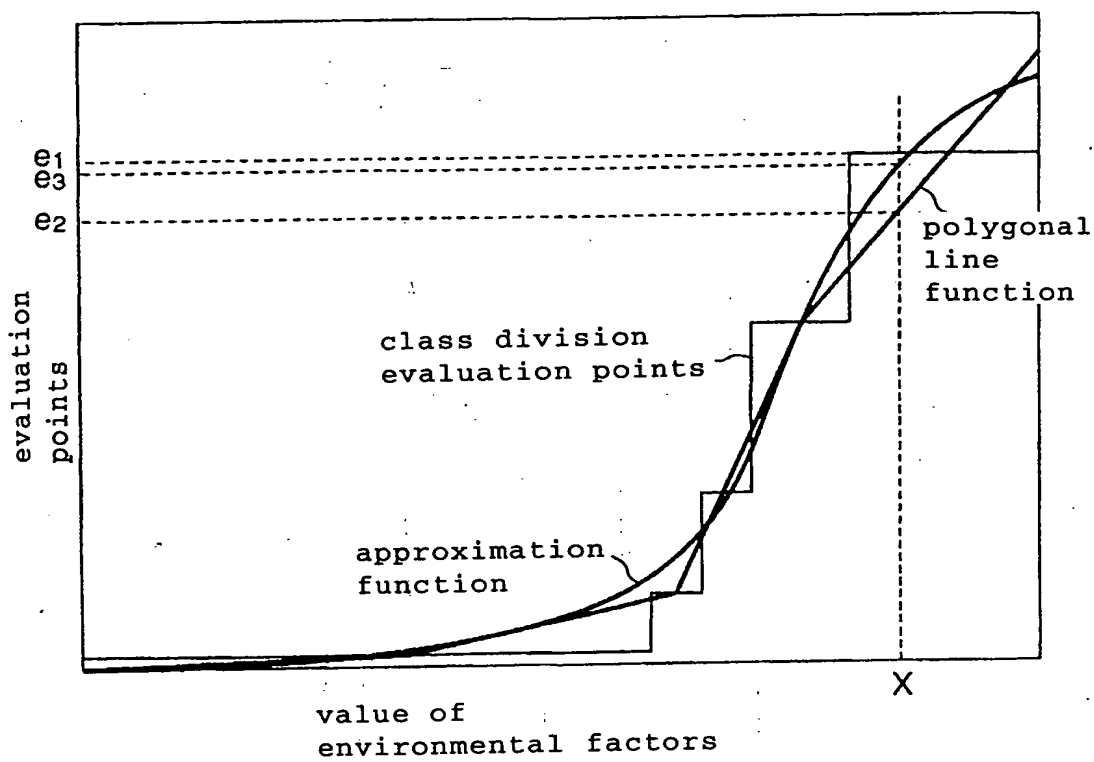


FIG. 1 8

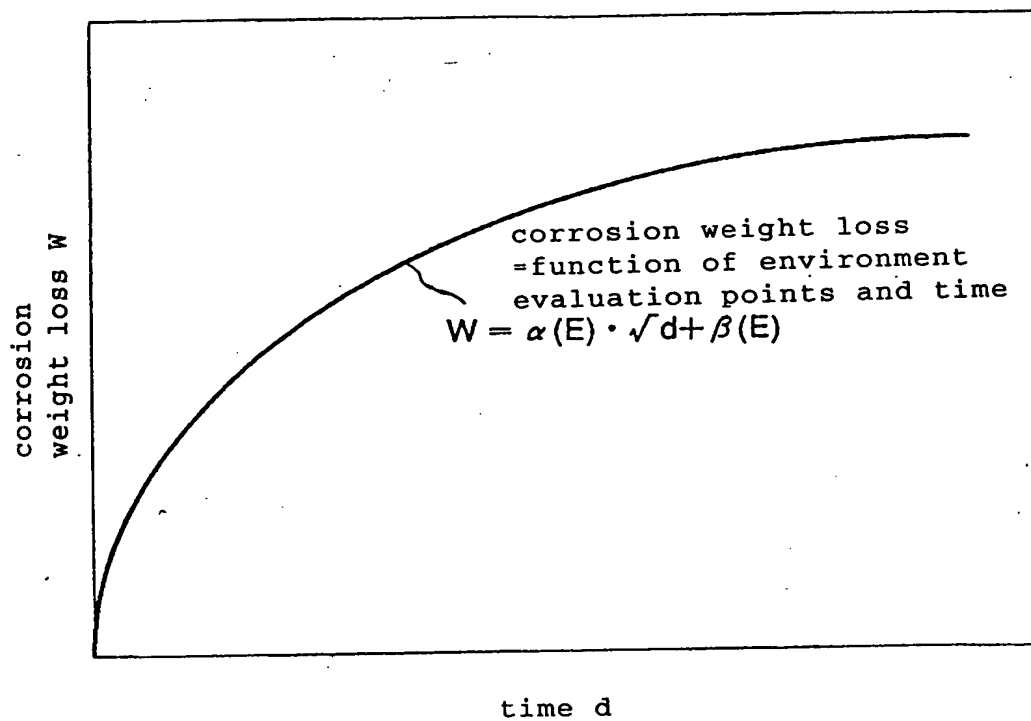


FIG. 1 9

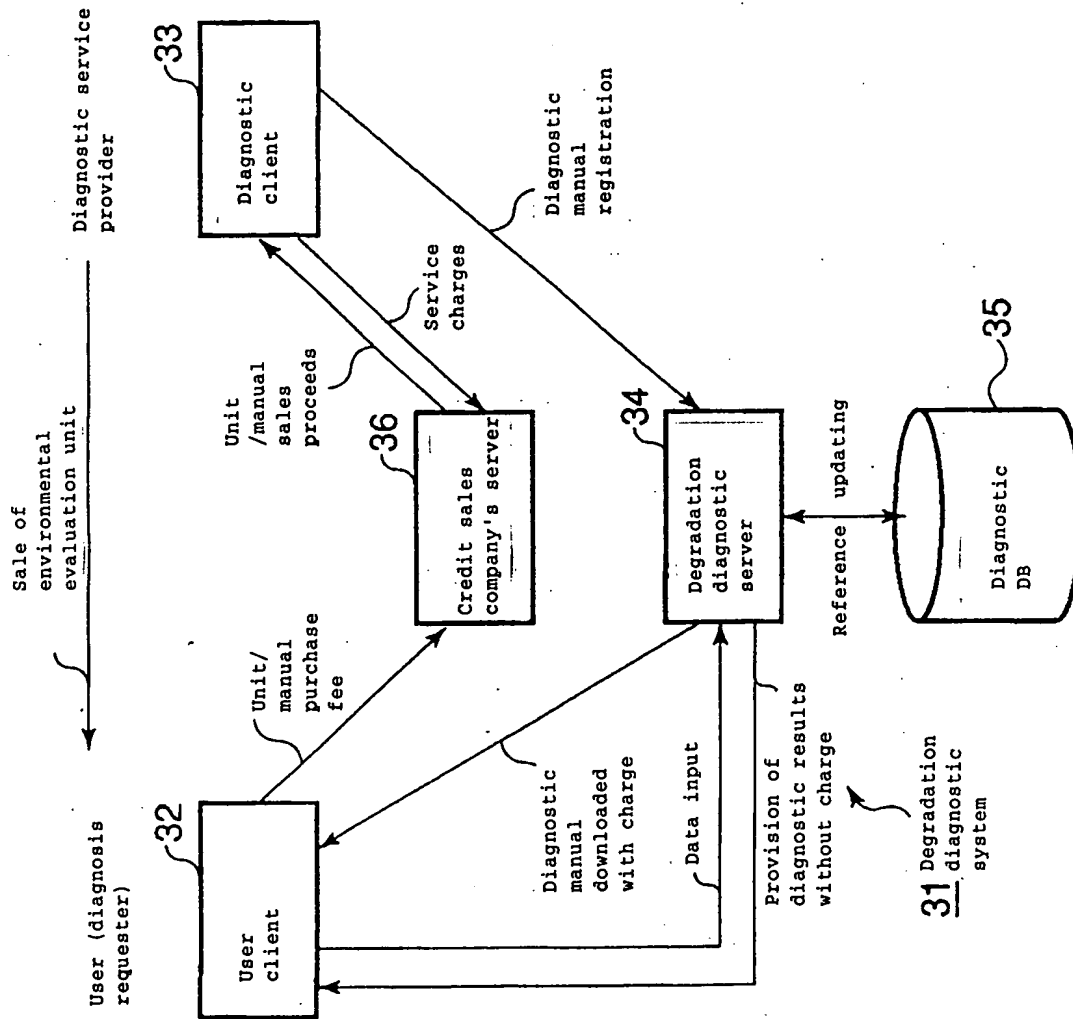


FIG. 20

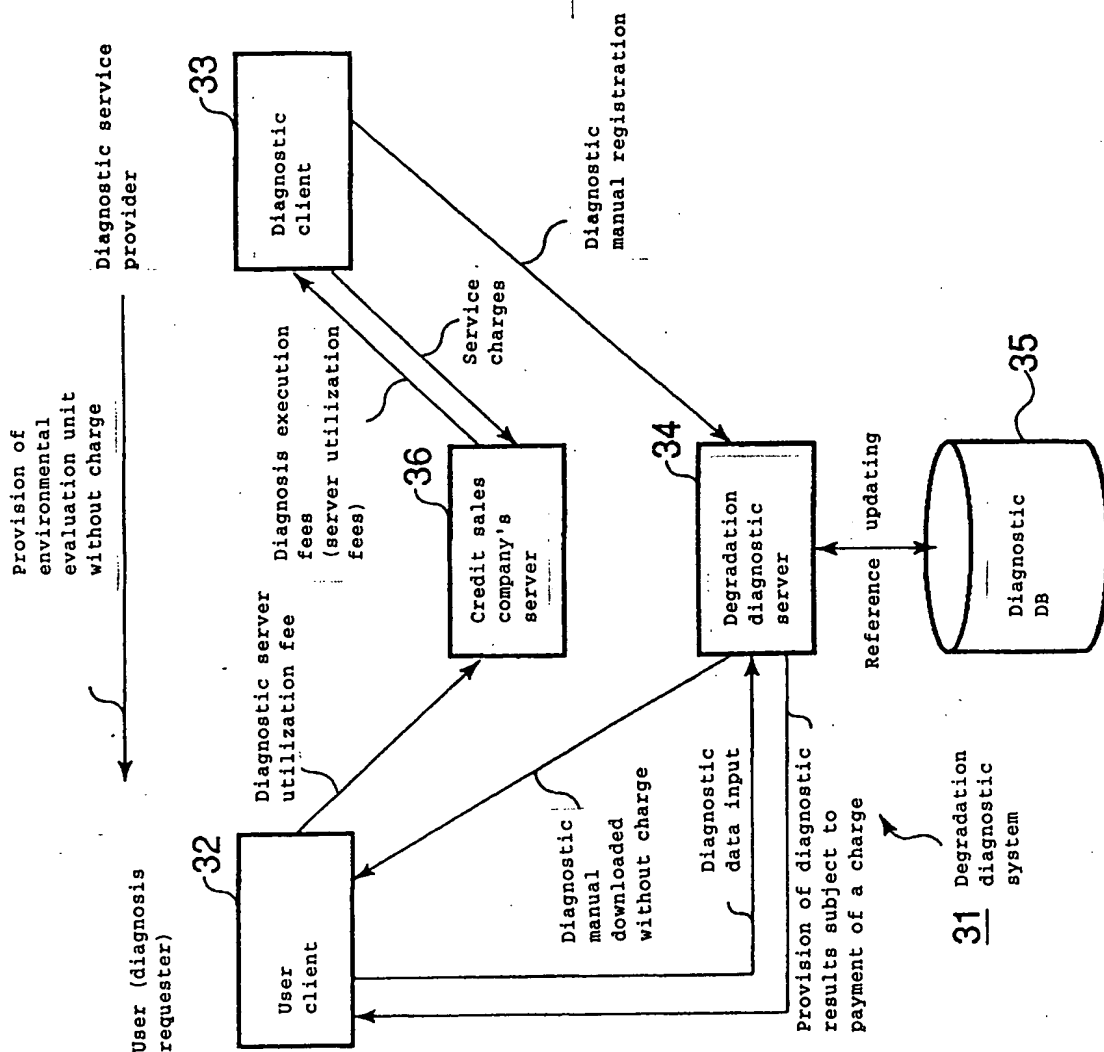


FIG. 21

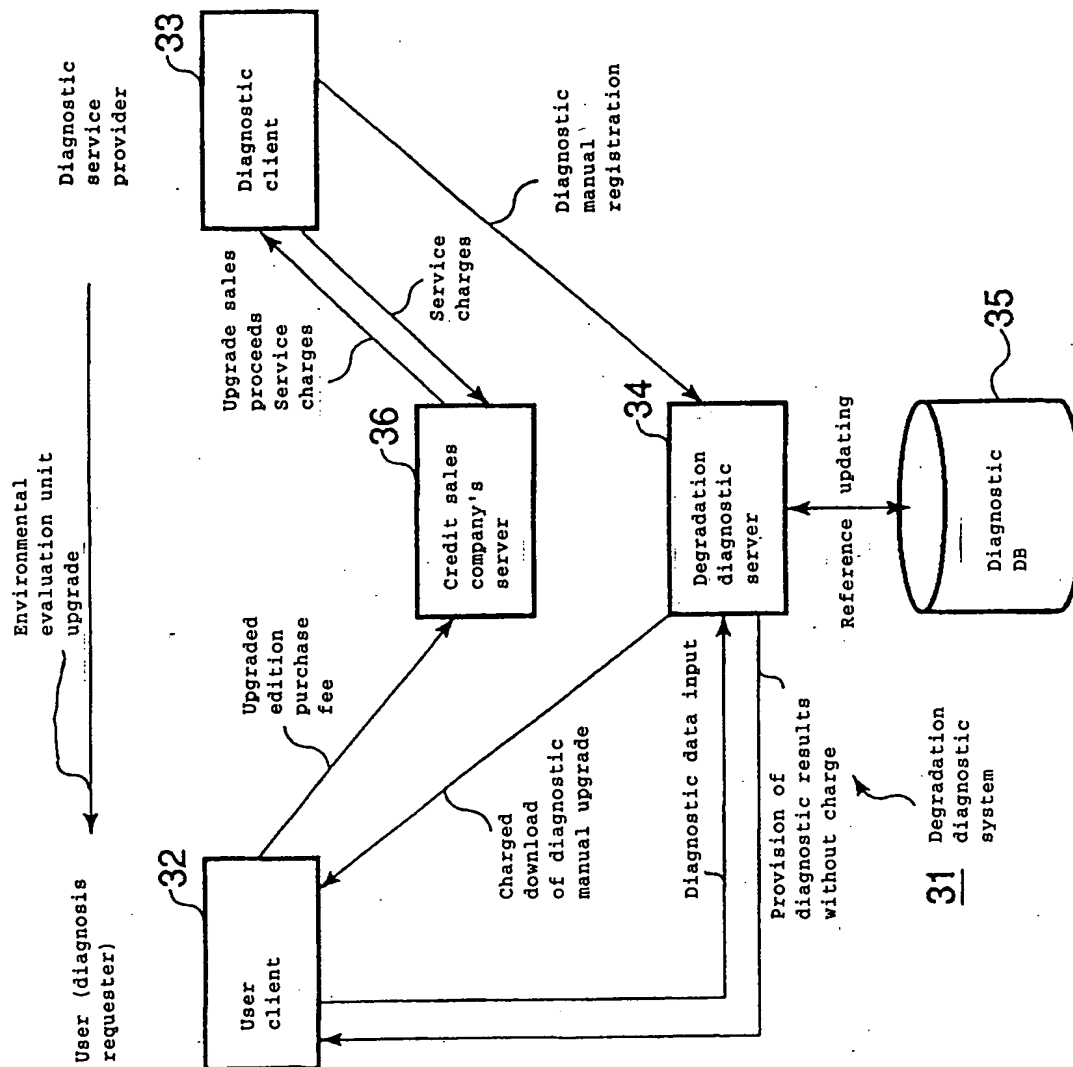


FIG. 22

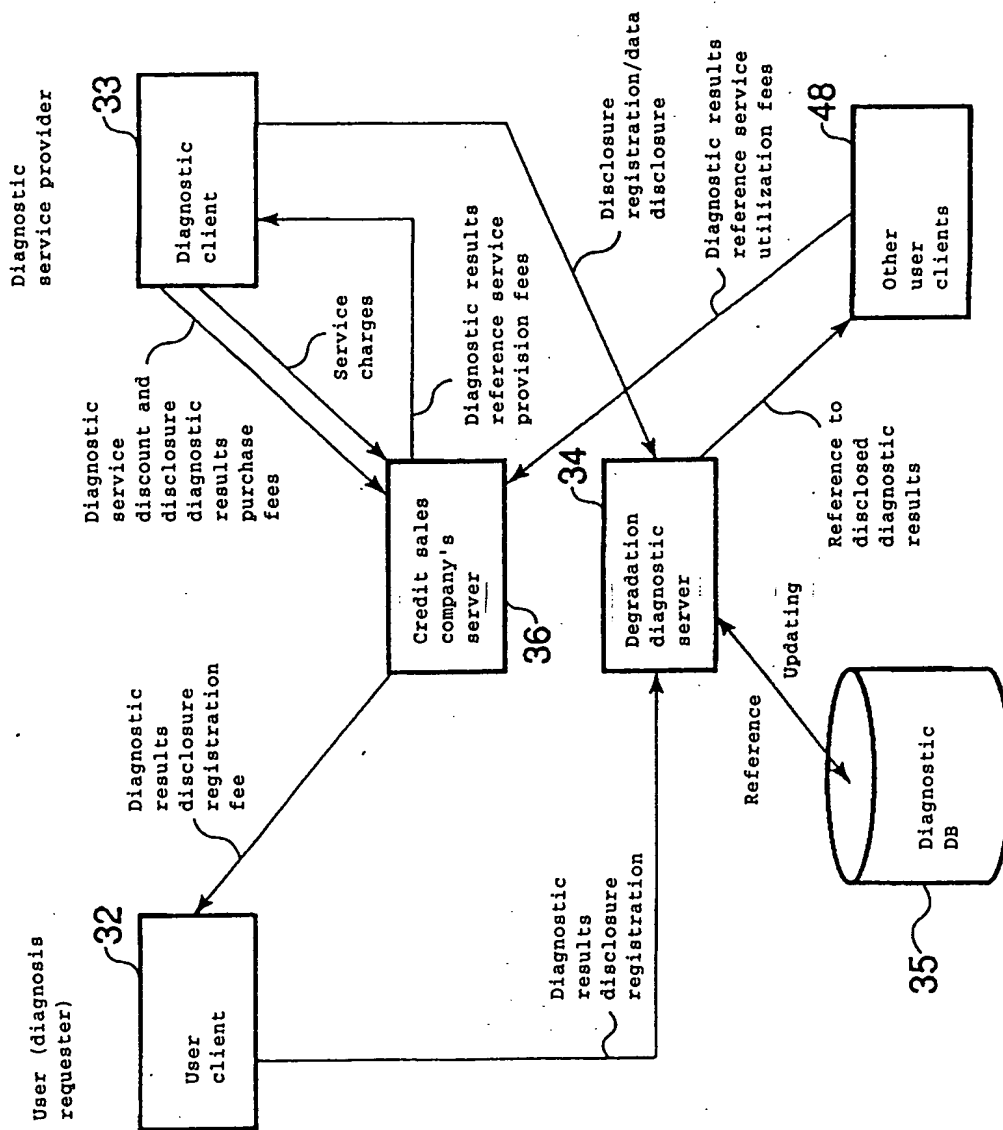


FIG. 23

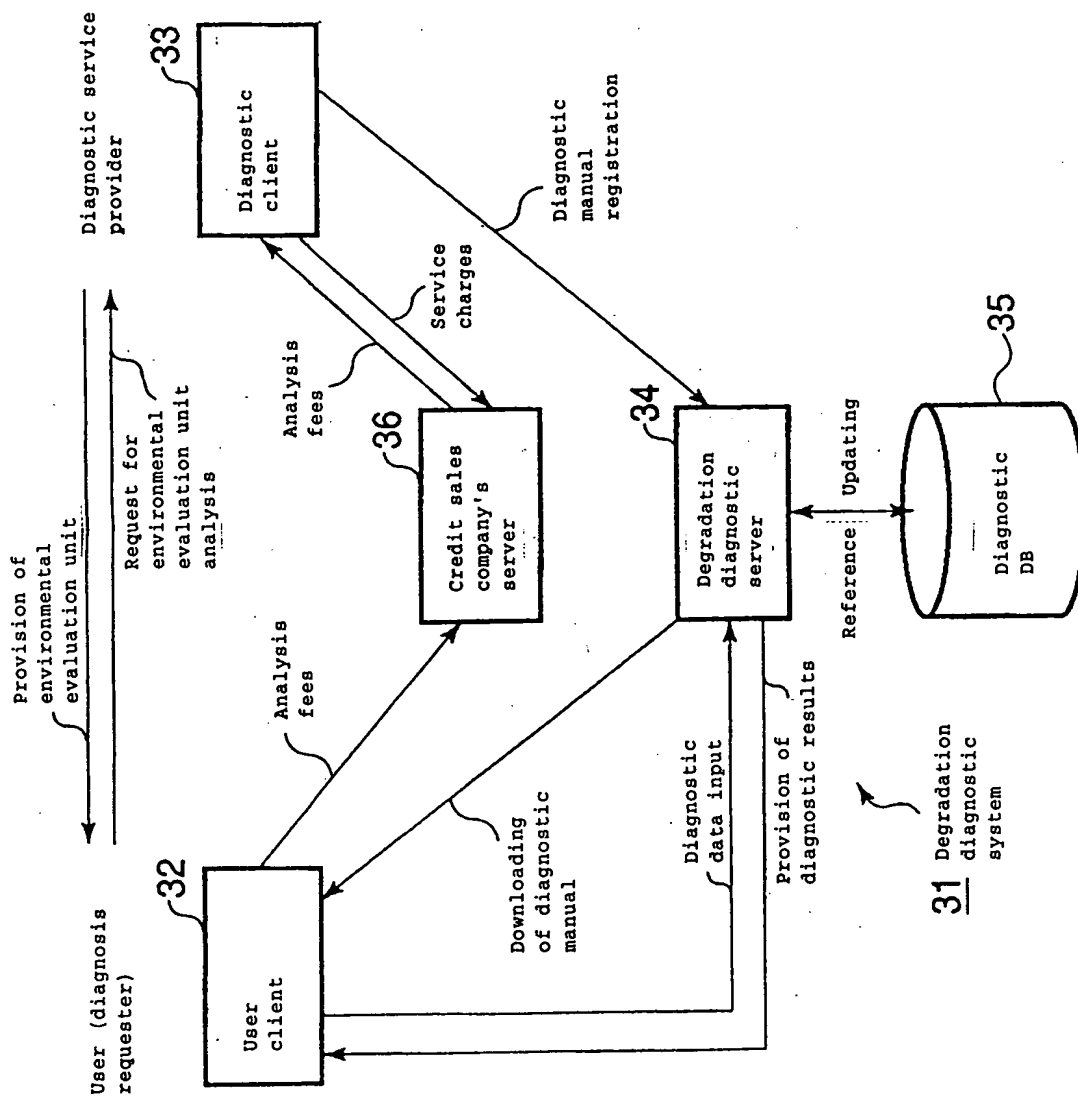


FIG. 24



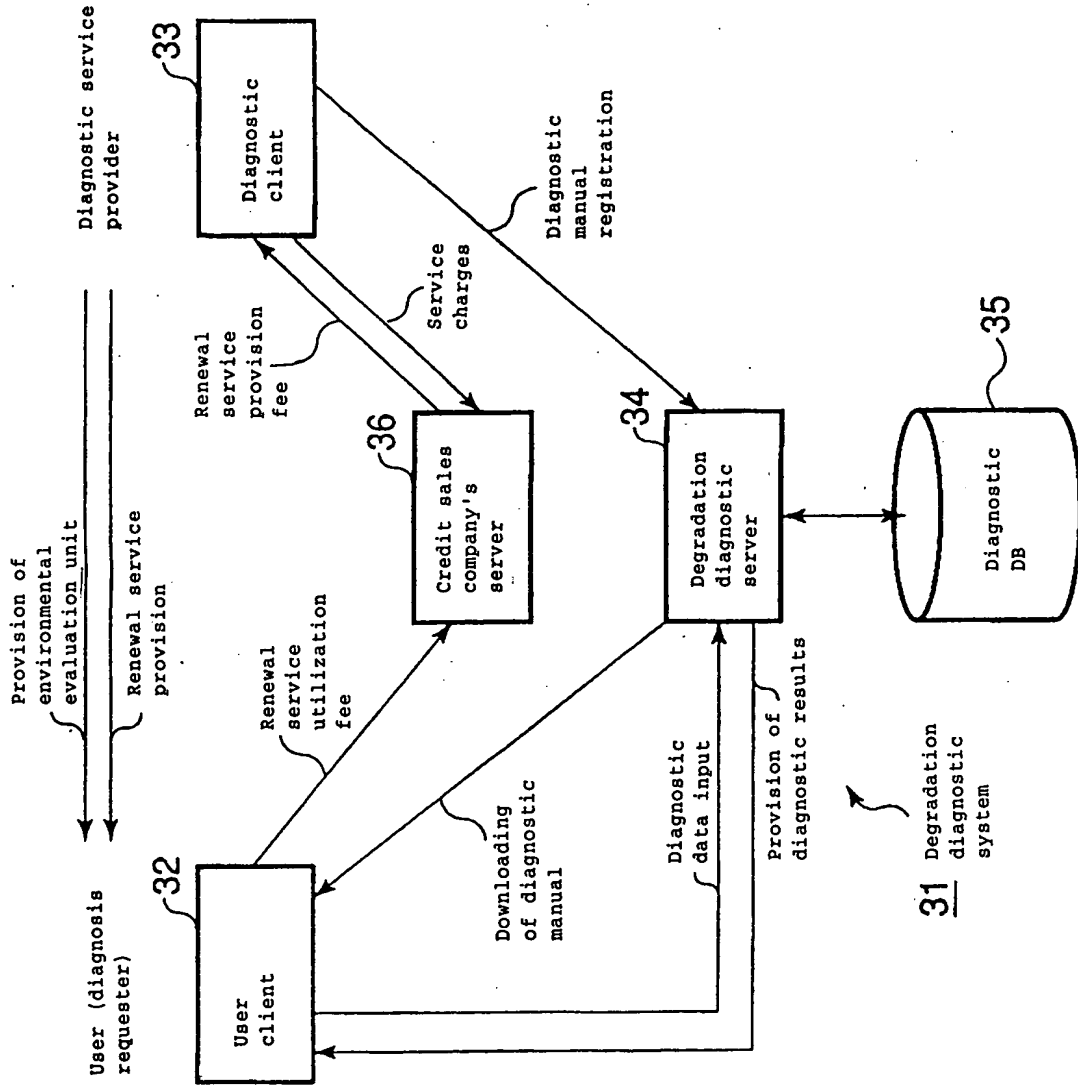


FIG. 25

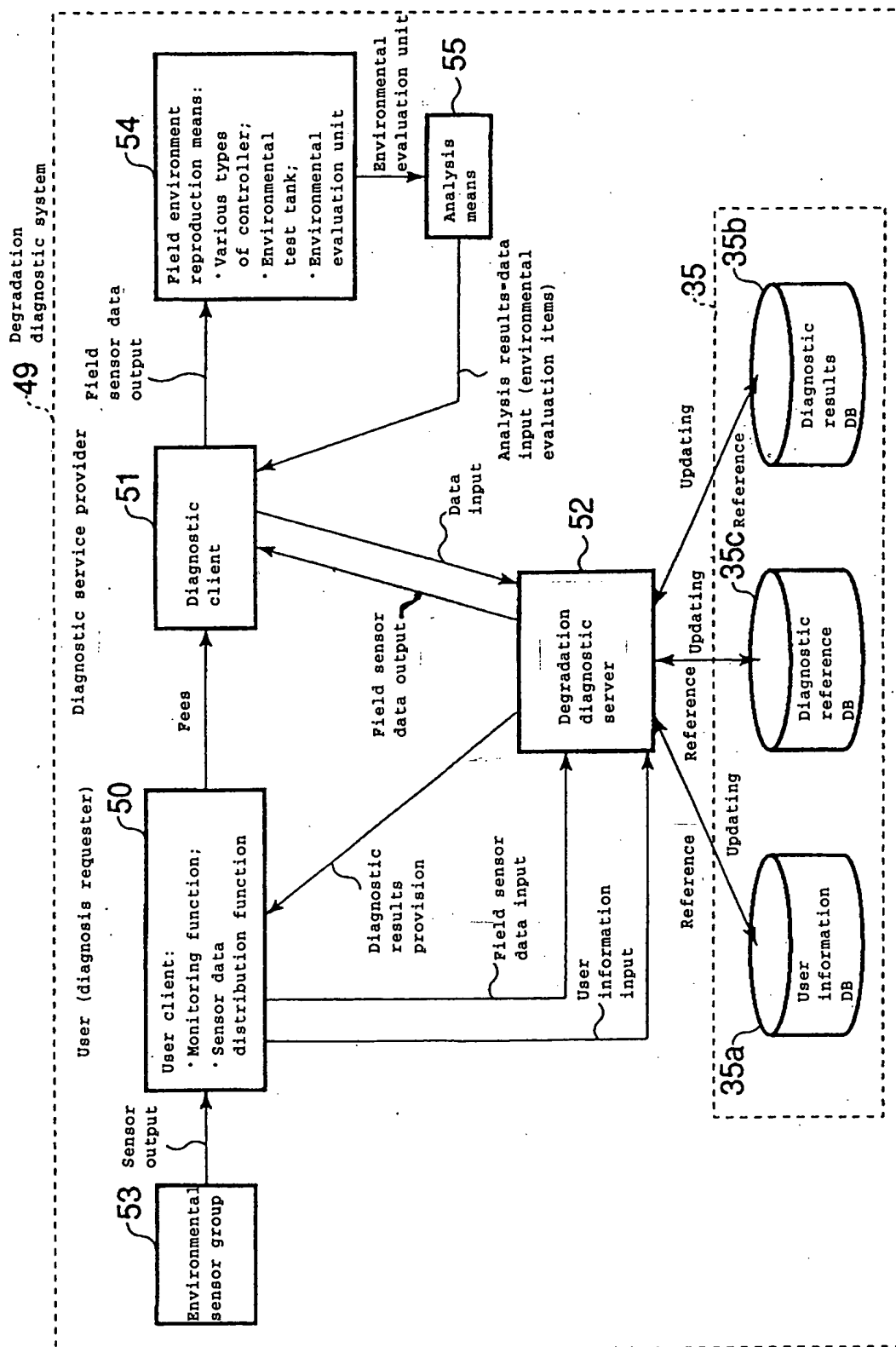


FIG. 26